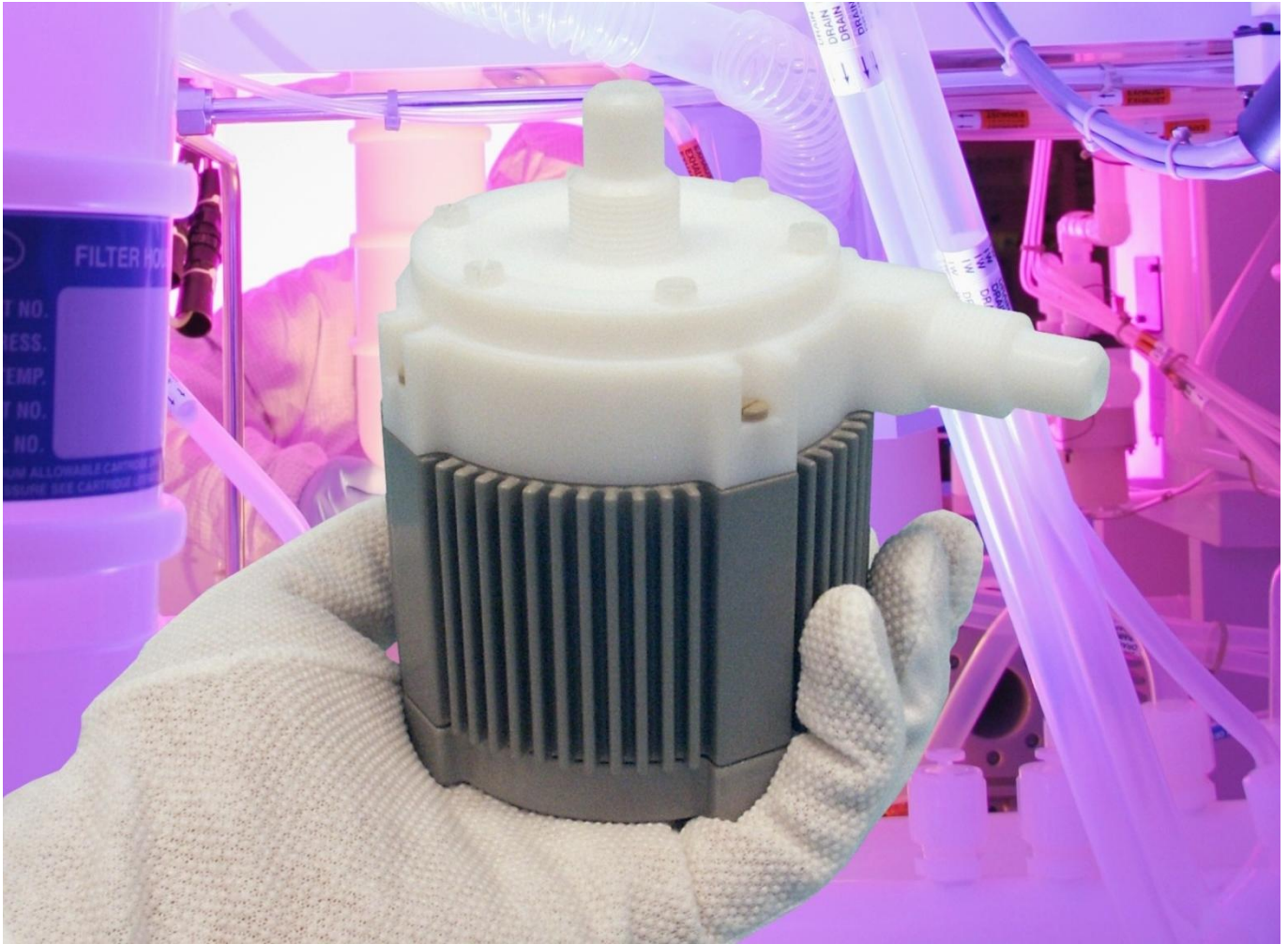


Better Pumps for Better Yield!



**No Seals, No Bearings,
No Particle Contamination!**

BPS-200

2.6 bar	(37.7 psi)
21 liters/min	(5.5 gallons/min)

Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!

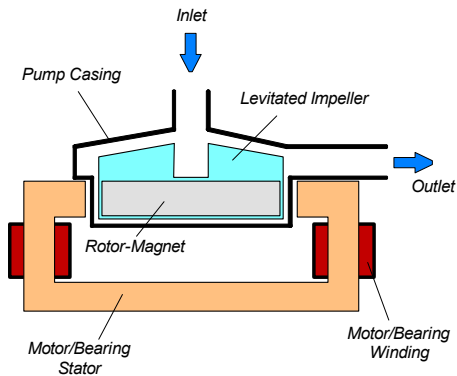


Figure 1: Schematic of the main elements of the maglev centrifugal pump

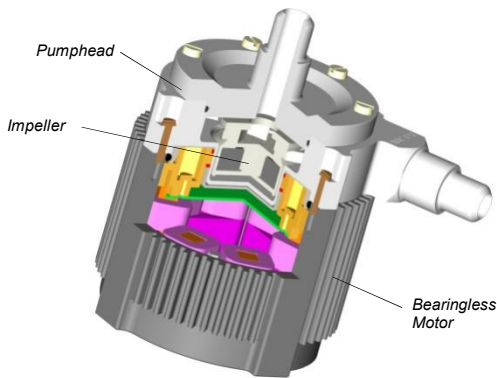


Figure 2: Maglev pump motor with pump head

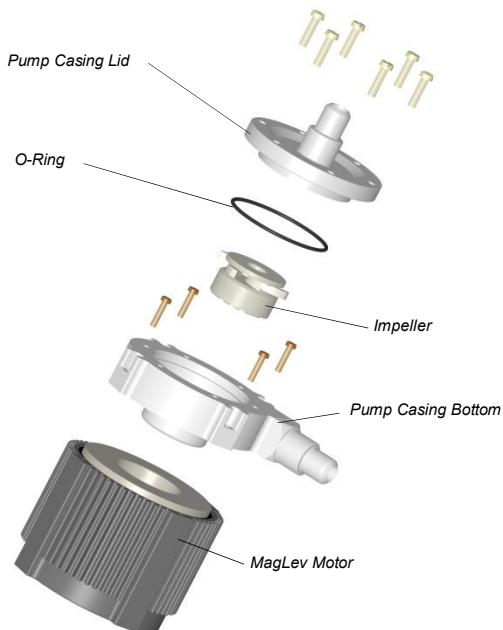


Figure 3: Disassembled pump head

REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

The BPS-200 pump system is a revolutionary centrifugal pump that has no bearings to wear out or seals to break down and fail. Based on the principles of magnetic levitation, the pump's impeller is suspended, contact-free, inside a sealed casing and is driven by the magnetic field of the motor (Figure 1).

The impeller and casing are both fabricated from chemical-resistant high purity fluorocarbon resins. Together with the rotor magnet they make up the pump head.

Fluid flow rate and pressure are precisely controlled by electronically regulating the impeller speed without pulsation. Closed loop flow or pressure control is easy configurable with the usage of an additional pressure or flow sensor. Various system configurations are possible as explained in the following sections.

SYSTEM BENEFITS

- Extremely low particle generation due to the absence of mechanically contacting parts.
- Increased equipment uptime.
- Lower maintenance costs by eliminating valves, bearings, rotating seals and costly rebuilds.
- Reduced risk of contamination due to the self-contained design with magnetic bearings.
- Very gentle to sensitive fluids due to low-shear design.
- No narrow gaps and fissures where particles or microorganisms could be become entrapped.
- Smooth, continuous flow without pressure pulsation.
- Electronic speed control.
- Compact design compared to pneumatic and mag-drive pumps.
- Proven technology in medical and semiconductor industry (MTBF > 50 years).

APPLICATIONS

- Semiconductor wet processing.
- Flip chip and advanced packaging.
- Solar cell production.
- Flat panel display manufacturing.
- Hard-disk fabrication.
- Printer ink handling.
- Pharmaceutical production.

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the BPS-200 pump system consists of a controller with an integrated user panel allowing the operator to set the speed manually (Figure 7). The speed is automatically stored in the internal EEPROM of the controller. As an option, the speed can also be set with an analog signal (see specification for Position 3a in Table 2).

EXTENDED SYSTEM CONFIGURATION

The extended version of the BPS-200 pump system (Figure 8) consists of a controller with an extended PLC interface. The PLC interface allows the speed to be set via an external signal, facilitating precise closed-loop flow or pressure control when either a flow or pressure sensor is integrated into the system. A computer can be connected via a USB interface to allow communication with the Levitronix® Service Software. Hence parameterization, firmware updates and failure analysis are possible.

Precise ultrapure flow control systems can be realized with the BPS-200 pump system in combination with LEVIFLOW® flowmeters. Levitronix® provides either turnkey solutions for closed-loop flow control or helps to design your own flow control system. Experience has been gained with fluids such as CMP slurries, surface-conditioning chemicals, plating solutions, ultrapure water and solvents. A block-diagram for a typical point of use flow control system with an additional pre-pressure regulator is shown in Figure 5. The versatility of Levitronix® flow control systems goes far beyond the capabilities of simple flow controllers. In addition to the flow control function, the Levitronix® control firmware comes with several condition monitoring features to monitor the integrity of the fluid circuit. Levitronix® flow control systems can generate alarms for preventive filter exchange, no-flow conditions or line clogging. Dynamic Condition Trending (DCT) enables failure prediction and scheduling of preventive maintenance (Figure 6).

ATEX / IECEx SYSTEM CONFIGURATION

Specific Levitronix® motors are ATEX / IECEx certified and allow therefore installation of motor and pump head within an ATEX Zone 2 area (see Figure 9). An Ex conform solution is needed for the motor cables to leave the Ex area. One option is an Ex certified cable system as listed in Table 4 (see Pos. 8) and shown in Figure 13.

- ATEX / IECEx certified for Category 3G/D (Zone 2 for Gas and Zone 22 Dust).
- Thermal classification T5 (< 100 °C = 212 °F) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX / IECEx marking of motor with pump head:
 - CE Ex II 3G Ex c nAc IIC T5
 - CE Ex II 3D Ex c tc IIIC T100°C IP6x
- Explosion groups:
 - Group IIA: Propane (IPA), Methane, Acetone, Acetaldehyde
 - Group IIB: Ethylene, Ethylenglycol
 - Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- ATEX / IECEx listing corresponds to UL hazardous location Class 1 Division 2.

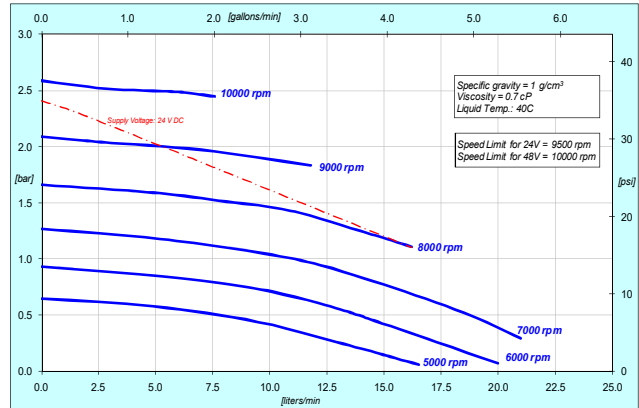


Figure 4: Pressure/flow curves for aqueous liquids (similar to water)

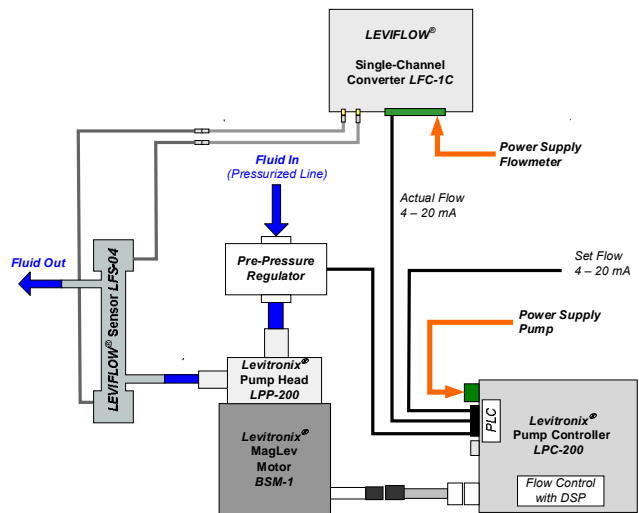


Figure 5: Point-of-use flow control with LEVIFLOW® flowmeter LFS-04 and pump system BPS-200

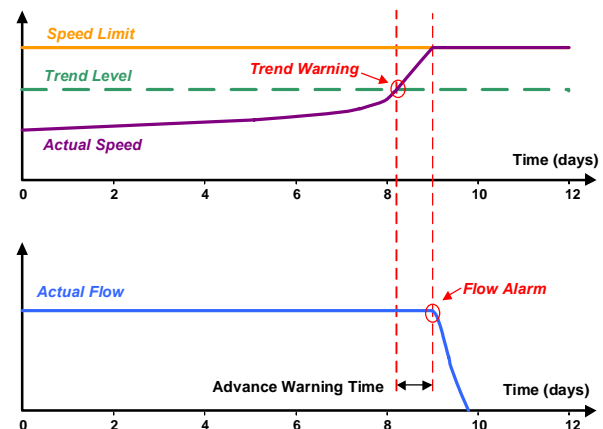


Figure 6: Dynamic Condition Trending (DCT)

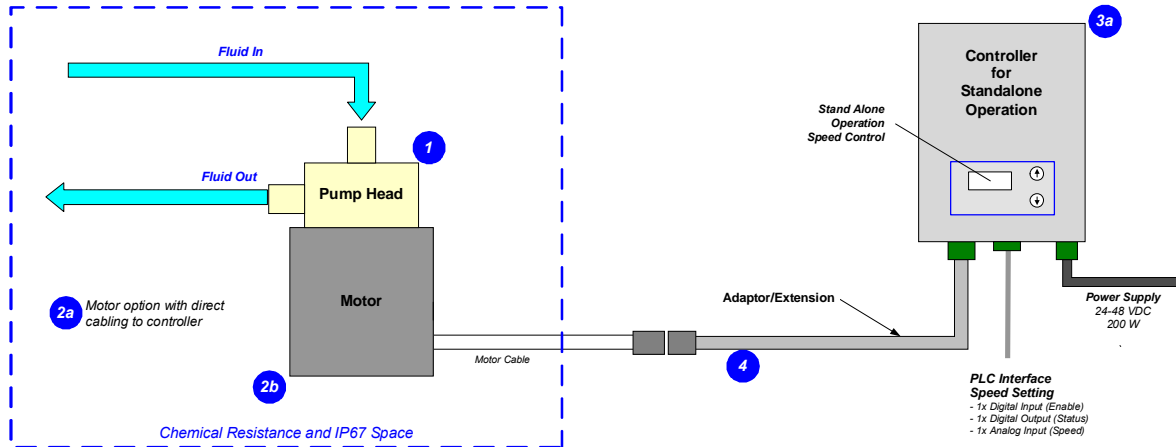


Figure 7: System configuration for standalone operation (Speed setting with integrated user panel)

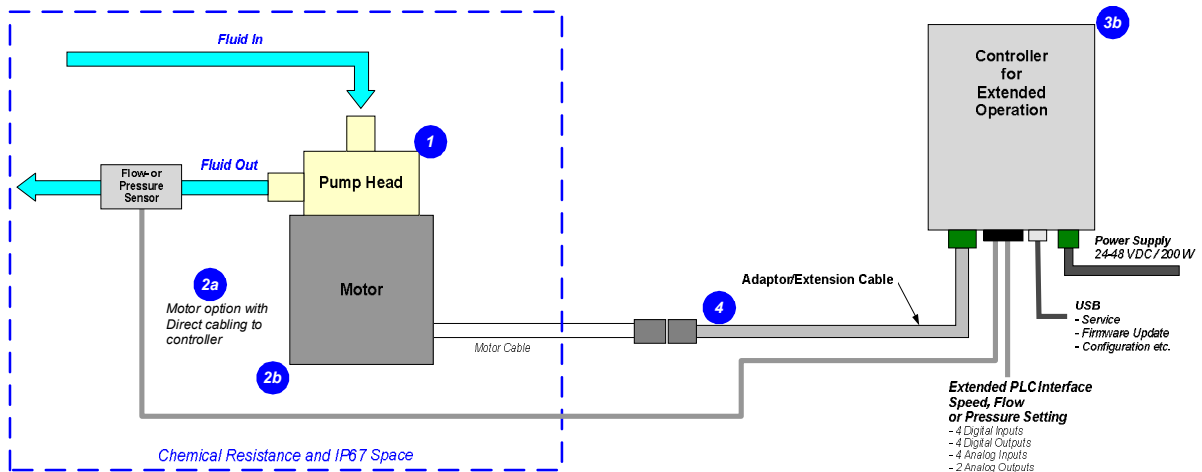


Figure 8: Extended operation (flow or pressure control) with extended controller

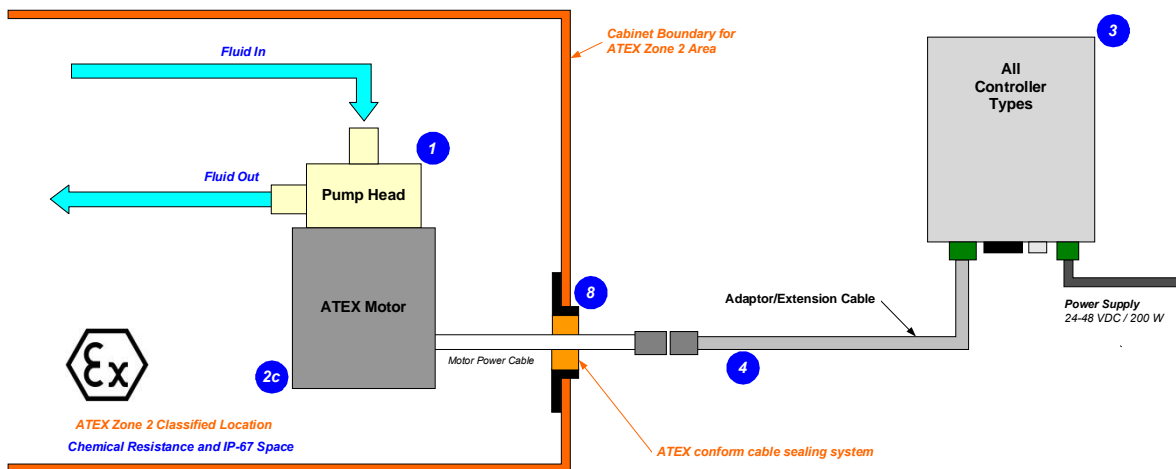


Figure 9: System Configuration for ATEX / IECEx applications

DIMENSIONS OF MAIN COMPONENTS

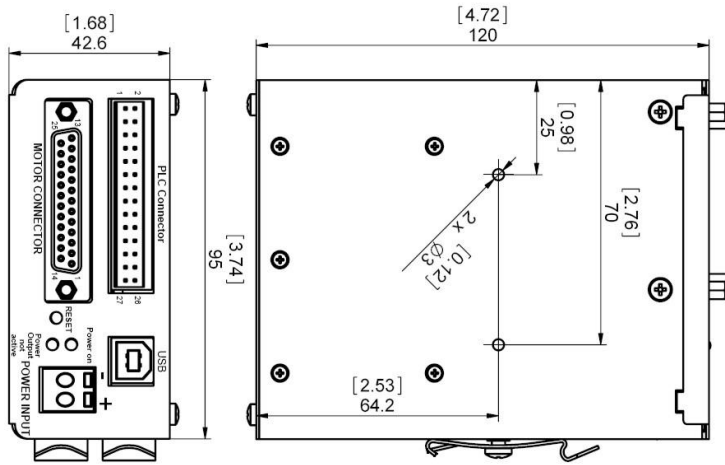


Figure 10: Dimensions of controllers LPC-200.2 (same basic dimensions for LPC-200.1)
 (dimensions in mm and [inch])

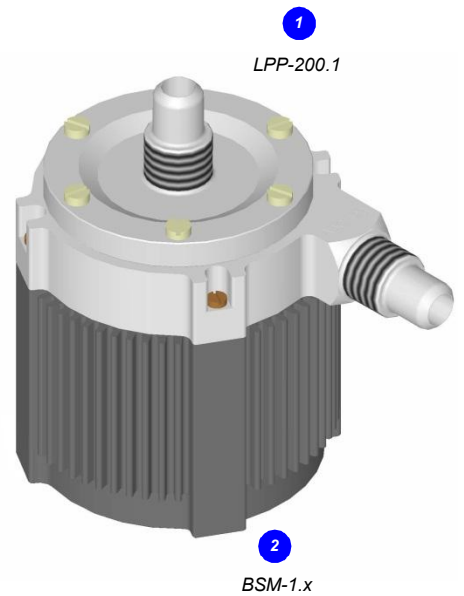
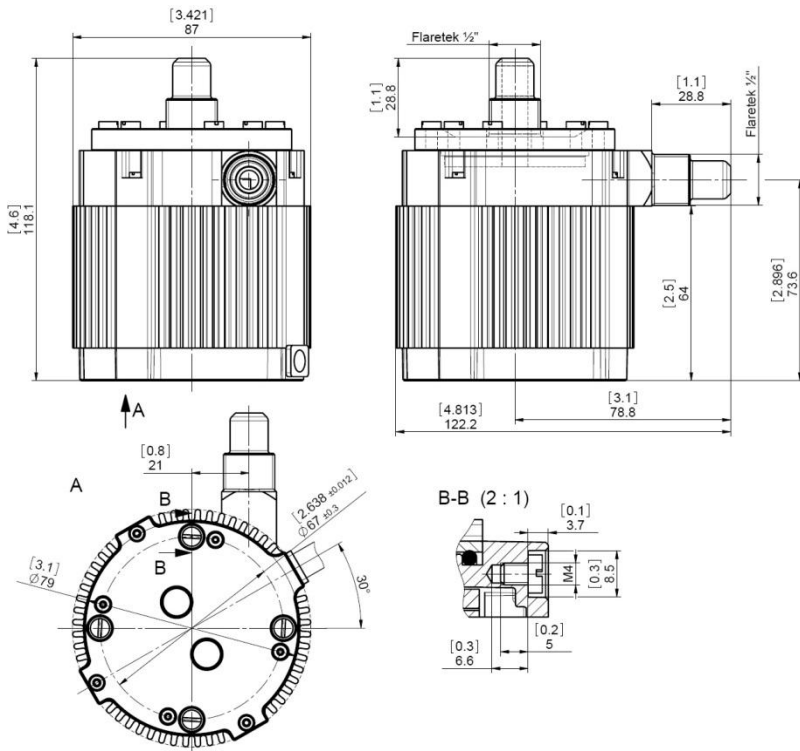


Figure 11: Dimensions of motor with pump head
 (dimensions in mm and [inch])

System Name	Article #	Pump Head	Motor	Controller	Note
BPS-200.3 BPS-200.4	100-90193 100-90194	LPP-200.1 (High Viscosity and Density)	BSM-1.4	LPC-200.1 LPC-200.2	Direct cabling between motor and controller. Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-200.1 BPS-200.2	100-90191 100-90192		BSM-1.3	LPC-200.1 LPC-200.2	Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article. Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-200.14 (ATEX) BPS-200.15 (ATEX)	100-90556 100-90557		BSM-1.6 (ATEX)	LPC-200.1 LPC-200.2	Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article. ATEX Cable Sealing System can be ordered according to Table 4. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.
BPS-200.37 BPS-200.24	100-90773 100-90703	LPP-200.11 (Improved bubble and priming behavior)	BSM-1.4	LPC-200.1 LPC-200.2	Direct cabling between motor and controller. Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-200.40 BPS-200.41	100-90776 100-90777		BSM-1.3	LPC-200.1 LPC-200.2	Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article. Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-200.44 (ATEX) BPS-200.45 (ATEX)	100-90780 100-90781		BSM-1.6 (ATEX)	LPC-200.1 LPC-200.2	Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article. ATEX Cable Sealing System can be ordered according to Table 4. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.

Table 1: Standard system configurations

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Pump Head	LPP-200.1 (High Viscosity/Density)	100-90281	Impeller / Pump Housing Sealing Ring / Fittings	High Purity PFA / PTFE Kalrez® perfluoroelastomer ¹ / ½" Flaretek ²
		LPP-200.11 (Improved priming/bubble behavior)	100-90702	Max. Flow Max. Diff.-Pressure Max. Viscosity / Density Max. Liquid Temp	21 liters/min / 55 gallons/min 2.6 bar / 37.7 psi LPP-200.1: 50cP / 1.8 g/cm3 90°C / 194°F LPP-200.11: < 20 cP
				Pumphead Selection	LPP-200.1: Usage for higher viscosity and density LPP-200.11: Usage for aqueous liquids and improved priming/bubble robustness
2a	Motor	BSM-1.4	100-10005	Housing	ETFE (chemical resistant) coated Aluminum, waterproofed (IP67)
2b	Motor	BSM-1.3	100-10004	Cable / Connectors	1x 5m cables with FEP jacket / 1x D-SUB (direct cable to controller)
2c	Motor (ATEX / IECEx)	BSM-1.6	100-10063	Cable / Connectors	1x 2m cable with FEP jacket / 1x circular (M23, IP-67) (needs extension adaptor cable for connection to controller)
				ATEX / IECEx Marking	CE II 3G Ex c nAc IIC T5 II 3D Ex c tc IIIC T100°C IP6x
3a	Standalone Controller (User Panel)	LPC-200.1	100-30008 (Controller with Enable connector incl. in 100-90335)	Electrical Power / Voltage	200 W / 24 - 48V DC
				Interfaces for Standalone Controller	Panel to set speed (automatic storage on internal EEPROM) PLC with 1x analog input ("Speed") 4 - 20 mA 1x digital input ("Enable") 0 - 24 V (optocoupler) 1x digital output ("Status") 0 - 24 V (relais)
3b	Extended Controller (PLC and USB)	LPC-200.2	100-30009 (Controller with PLC connector incl. in 100-90336)	Interfaces for Extended Controller	<ul style="list-style-type: none"> - up to 4 digital inputs - up to 4 digital outputs - up to 2 analog inputs - up to 2 analog outputs 0 - 24 V (optocoupler) 0 - 24 V (relais) 4 - 20mA 0 - 10 V 0 - 5 V USB interface (for service and system monitoring)

Table 2: Specification of standard components

1: Kalrez® is a registered trademark of DuPont Dow Elastomers 2: Pump heads with Pillar FM ½" fittings available.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
4	Extension Adaptor Cable for Power	MCA-1.4-05 (0.5m) MCA-1.4-30 (3m) MCA-1.4-50 (5m) MCA-1.4-70 (7m) MCA-1.4-100 (10m)	190-10228 190-10170 190-10187 190-10229 190-10230	Jacket Material Connectors	PVC-jacket Circular Hummel to D-SUB connector

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5	Air Cooling Module	ACM-1.1	190-10003	Material / Connection Port Air Pressure / Consumption	PVDF / NPT ½" ~ 0.5bar (7.2 psi)
6	Mounting Base Plate	MBP-1.1	190-10004	Material	PVDF
7 (a,b,c, d,e)	Impeller Exchange Kits	IEK-200.1 (for LPP-200.1)	100-90517	Impeller LPI-200.1/2 (a) Sealing O-Ring (b)	PFA O-Ring, Kalrez, 50.52 x 1.78
		IEK-200.2 (for LPP-200.11)	100-90524	Pump Casing Screws (c) Pump Motor Screws (d) Exchange Tool IET-1.1 (e)	6 pieces, PVDF, M4 x 15 mm 4 pieces, PEEK, M3 x 14 mm POM-C
8	ATEX Cable Sealing System	ACS-A.1	100-90292	Sleeve (a) / Gasket (b) Frame (c) Cable Module (d)	Stainless Steel and EPDM Roxylon (EPDM rubber) Roxylon (EPDM rubber) Note: Lubricant (e) and measurement plates (f) are included.
9a	AC/DC Power Supply	TSP 360-124 (Standard Traco Supply)	100-40016	Voltage / Power Output / Voltage Input Dimensions Certification	24 VDC / 360 W 85 - 132 / 187 - 264 VAC, autoselect 125 x 125 x 80 mm UL, CSA, CB, Semi F47
9b	AC/DC Power Supply	TSP 360-148	100-40017	Voltage / Power Output	48 VDC / 360 W (other specifications same as 9a)
10	Screw Set	Screw Set SS+PTFE	100-90447	Number/Dimensions Material	4 pcs M3x14 and 6 pcs M4x16 Stainless Steel+ PTFE coating Needed to increase maximum static pressure of pumphead.

Table 4: Specification of accessories

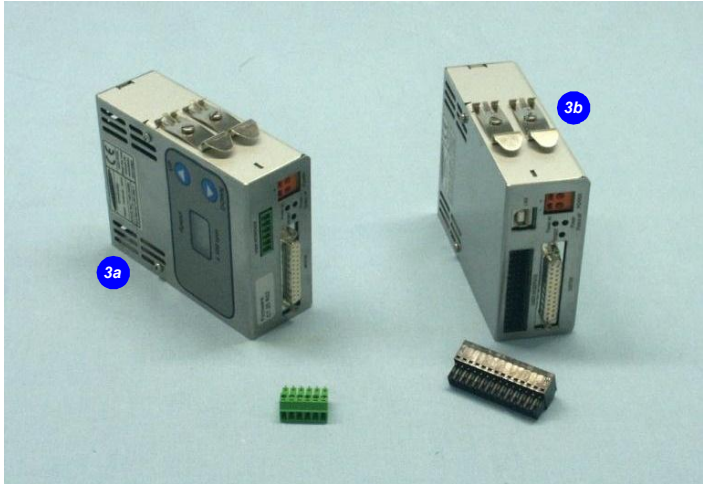
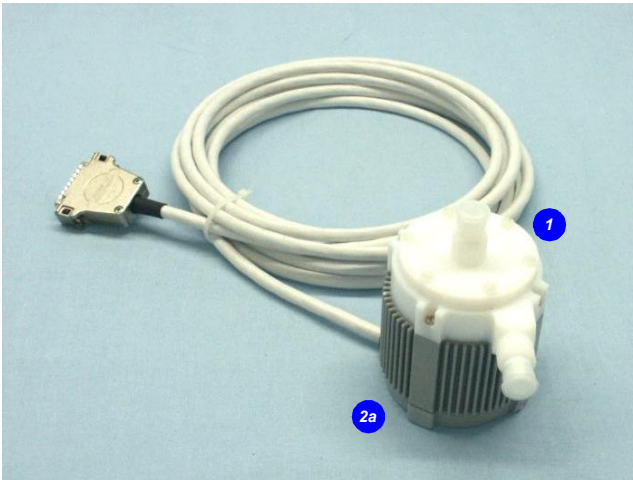


Figure 12: Pump system BPS-200 with main standard components

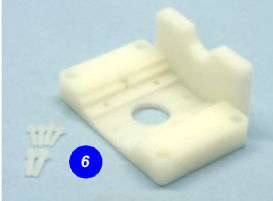
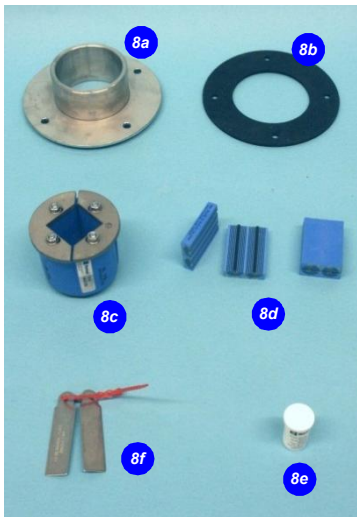
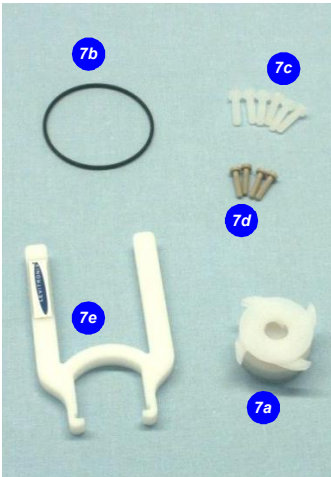


Figure 13: Accessories

**Levitronix[®] MagLev Pump Technology
Better Pumps for Better Yield!**

LEVITRONIX® THE COMPANY

Levitronix® is the world-wide leader in magnetically levitated bearingless motor technology. Levitronix® was the first company to introduce bearingless motor technology to the Semiconductor, Medical and Life Science markets. The company is ISO 9001 certified. Production and quality control facilities are located in Switzerland. In addition, Levitronix® is committed to bring other highly innovative products like the LEVIFLOW® flowmeter series to the market.



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